SEQUENCE LISTING

<110> The Scripps Reasearch Institute
     Ralph A. Reisfeld
     Andrew G. Niethammer
     Rong Xiang

<120> DNA VACCINE AGAINST PROLIFERATING
  ENDOTHELIAL CELLS AND METHODS OF USE THEREOF

<130> TSRI-829.0

<160> 6

<170> FastSEQ for Windows Version 4.0

<210> 1
<211> 4071
<212> DNA
<213> human

<400> 1
```
atggagagca aggtgctgct ggccgtcgcc ctgtggctct gcgtggagac ccgggccgcc 60
tctgtgggtt tgcctagtgt ttctcttgat ctgcccaggc tcagcataca aaaagacata 120
cttacaatta aggctaatac aactcttcaa attacttgca ggggacagag ggacttggac 180
tggctttggc ccaataatca gagtggcagt gagcaaaggg tggaggtgac tgagtgcagc 240
gatggcctct tctgtaagac actcacaatt ccaaaagtga tcggaaatga cactggagcc 300
tacaagtgct tctaccggga aactgacttg gcctcggtca tttatgtcta tgttcaagat 360
tacagatctc catttattgc ttctgttagt gaccaacatg gagtcgtgta cattactgag 420
aacaaaaaca aaactgtggt gattccatgt ctcgggtcca tttcaaatct caacgtgtca 480
ctttgtgcaa gatacccaga aaagagattt gttcctgatg gtaacagaat ttcctgggac 540
agcaagaagg gctttactat tcccagctac atgatcagct atgctggcat ggtcttctgt 600
gaagcaaaaa ttaatgatga agttaccag tctattatgt acatagttgt cgttgtaggg 660
tataggattt atgatgtggt tctgagtccg tctcatggaa ttgaactatc tgttggagaa 720
aagcttgtct taaattgtac agcaagaact gaactaaatg tggggattga cttcaactgg 780
gaataccctt cttcgaagca tcagcataag aaacttgtaa accgagacct aaaaacccag 840
tctgggagtg agatgaagaa atttttgagc accttaacta tagatggtgt aacccggagt 900
gaccaaggat tgtacacctg tgcagcatcc agtgggctga tgaccaagaa gaacagcaca 960
tttgtcaggg tccatgaaaa accttttgtt gcttttggaa gtggcatgga atctctggtg 1020
gaagccacgg tgggggagcg tgtcagaatc cctgcgaagt accttggtta cccacccca 1080
gaaataaaat ggtataaaaa tggaataccc cttgagtcca atcacacaat taaagcgggg 1140
catgtactga cgattatgga agtgagtgaa agagacacag gaaattacac tgtcatcctt 1200
accaatccca tttcaaagga gaagcagagc catgtggtct ctctggttgt gtatgtccca 1260
ccccagattg gtgagaaatc tctaatctct cctgtggatt cctaccagta cggcaccact 1320
caaacgctga catgtacggt ctatgccatt cctccccgc atcacatcca ctggtattgg 1380
cagttggagg aagagtgcgc caacgagccc agccaagctg tctcagtgac aaacccatac 1440
ccttgtgaag aatggagaag tgtggaggac ttccagggag gaaataaaat tgaagttaat 1500
aaaaatcaat ttgctctaat tgaaggaaaa aacaaaactg taagtaccct tgttatccaa 1560
gcggcaaatg tgtcagcttt gtacaaatgt gaagcggtca caaagtcgg gagaggagag 1620
agggtgatct ccttccacgt gaccaggggt cctgaaatta ctttgcaacc tgacatgcag 1680
cccactgagc aggagagcgt gtctttgtgg tgcactgcag acagatctac gtttgagaac 1740
ctcacatggt acaagcttgg cccacagcct ctgccaatcc atgtgggaga gttgcccaca 1800
```

```
cctgtttgca agaacttgga tactctttgg aaattgaatg ccaccatgtt ctctaatagc 1860
acaaatgaca ttttgatcat ggagcttaag aatgcatcct tgcaggacca aggagactat 1920
gtctgccttg ctcaagacag gaagaccaag aaaagacatt gcgtggtcag gcagctcaca 1980
gtcctagagc gtgtggcacc cacgatcaca ggaaacctgg agaatcagac gacaagtatt 2040
ggggaaagca tcgaagtctc atgcacggca tctgggaatc cccctccaca gatcatgtgg 2100
tttaaagata tgagaccct tgtagaagac tcaggcattg tattgaagga tgggaaccgg 2160
aacctcacta tccgcagagt gaggaaggag gacgaaggcc tctacacctg ccaggcatgc 2220
agtgttcttg ctgtgcaaa agtggaggca ttttttcataa tagaaggtgc ccaggaaaag 2280
acgaacttgg aaatcattat tctagtaggc acggcggtga ttgccatgtt cttctggcta 2340
cttcttgtca tcatcctacg gaccgttaag cgggccaatg gaggggaact gaagacaggc 2400
tacttgtcca tcgtcatgga tccagatgaa ctcccattgg atgaacattg tgaacgactg 2460
ccttatgatg ccagcaaatg ggaattcccc agagaccggc tgaagctagg taagcctctt 2520
ggccgtggtg cctttggcca agtgattgaa gcagatgcct ttggaattga caagacagca 2580
acttgcagga cagtagcagt caaaatgttg aaagaaggag caacacacag tgagcatcga 2640
gctctcatgt ctgaactcaa gatcctcatt catattggtc accatctcaa tgtggtcaac 2700
cttctaggtg cctgtaccaa gccaggaggg ccactcatgg tgattgtgga attctgcaaa 2760
tttggaaacc tgtccactta cctgaggagc aagagaaatg aatttgtccc ctacaagacc 2820
aaagggcac gattccgtca agggaaagac tacgttggag caatccctgt ggatctgaaa 2880
cggcgcttgg acagcatcac cagtagccag agctcagcca gctctggatt tgtggaggag 2940
aagtccctca gtgatgtaga agaagaggaa gctcctgaag atctgtataa ggacttcctg 3000
accttggagc atctcatctg ttacagcttc caagtggcta agggcatgga gttcttggca 3060
tcgcgaaagt gtatccacag ggacctggcg gcacgaaata tcctcttatc ggagaagaac 3120
gtggttaaaa tctgtgactt tggcttggcc cgggatattt ataaagatcc agattatgtc 3180
agaaaaggag atgctcgcct ccctttgaaa tggatggccc cagaaacaat ttttgacaga 3240
gtgtacacaa tccagagtga cgtctggtct tttggtgttt tgctgtggga atatttttcc 3300
ttaggtgctt ctccatatcc tggggtaaag attgatgaag aattttgtag gcgattgaaa 3360
gaaggaacta gaatgagggc ccctgattat actacaccag aaatgtacca gaccatgctg 3420
gactgctggc acggggagcc cagtcagaga cccacgtttt cagagttggt ggaacatttg 3480
ggaaatctct tgcaagctaa tgctcagcag gatggcaaag actacattgt tcttccgata 3540
tcagagactt tgagcatgga agaggattct ggactctctc tgcctacctc acctgtttcc 3600
tgtatggagg aggaggaagt atgtgacccc aaattccatt atgacaacac agcaggaatc 3660
agtcagtatc tgcagaacag taagcgaaag agccggcctg tgagtgtaaa aacatttgaa 3720
gatatcccgt tagaagaacc agaagtaaaa gtaatcccag atgacaacca gacggacagt 3780
ggtatggttc ttgcctcaga gagctgaaaa actttggaag acagaaccaa attatctcca 3840
tcttttggtg gaatggtgcc cagcaaaagc agggagtctg tggcatctga aggctcaaac 3900
cagacaagcg gctaccagtc cggatatcac tccgatgaca cagacaccac cgtgtactcc 3960
agtgaggaag cagaactttt aaagctgata gagattggag tgcaaaccgg tagcacagcc 4020
cagattctcc agcctgactc ggggaccaca ctgagctctc ctcctgttta a         4071
```

<210> 2
<211> 1356
<212> PRT
<213> human

<400> 2
```
Met Gln Ser Lys Val Leu Leu Ala Val Ala Leu Trp Leu Cys Val Glu
1               5                   10                  15
Thr Arg Ala Ala Ser Val Gly Leu Pro Ser Val Ser Leu Asp Leu Pro
            20                  25                  30
Arg Leu Ser Ile Gln Lys Asp Ile Leu Thr Ile Lys Ala Asn Thr Thr
            35                  40                  45
Leu Gln Ile Thr Cys Arg Gly Gln Arg Asp Leu Asp Trp Leu Trp Pro
        50                  55                  60
Asn Asn Gln Ser Gly Ser Glu Gln Arg Val Glu Val Thr Glu Cys Ser
```

```
65                        70                        75                        80
Asp Gly Leu Phe Cys Lys Thr Leu Thr Ile Pro Lys Val Ile Gly Asn
                85                        90                        95
Asp Thr Gly Ala Tyr Lys Cys Phe Tyr Arg Glu Thr Asp Leu Ala Ser
                100                       105                       110
Val Ile Tyr Val Tyr Val Gln Asp Tyr Arg Ser Pro Phe Ile Ala Ser
                115                       120                       125
Val Ser Asp Gln His Gly Val Val Tyr Ile Thr Glu Asn Lys Asn Lys
145             130                       135                       140
Thr Val Val Ile Pro Cys Leu Gly Ser Ile Ser Asn Leu Asn Val Ser
145                       150                       155                       160
Leu Cys Ala Arg Tyr Pro Glu Lys Arg Phe Val Pro Asp Gly Asn Arg
                165                       170                       175
Ile Ser Trp Asp Ser Lys Lys Gly Phe Thr Ile Pro Ser Tyr Met Ile
                180                       185                       190
Ser Tyr Ala Gly Met Val Phe Cys Glu Ala Lys Ile Asn Asp Glu Ser
                195                       200                       205
Tyr Gln Ser Ile Met Tyr Ile Val Val Val Gly Tyr Arg Ile Tyr
                210                       215                       220
Asp Val Val Leu Ser Pro Ser His Gly Ile Glu Leu Ser Val Gly Glu
225                       230                       235                       240
Lys Leu Val Leu Asn Cys Thr Ala Arg Thr Glu Leu Asn Val Gly Ile
                245                       250                       255
Asp Phe Asn Trp Glu Tyr Pro Ser Ser Lys His Gln His Lys Lys Leu
                260                       265                       270
Val Asn Arg Asp Leu Lys Thr Gln Ser Gly Ser Glu Met Lys Lys Phe
                275                       280                       285
Leu Ser Thr Leu Thr Ile Asp Gly Val Thr Arg Ser Asp Gln Gly Leu
                290                       295                       300
Tyr Thr Cys Ala Ala Ser Ser Gly Leu Met Thr Lys Lys Asn Ser Thr
305                       310                       315                       320
Phe Val Arg Val His Glu Lys Pro Phe Val Ala Phe Gly Ser Gly Met
                325                       330                       335
Glu Ser Leu Val Glu Ala Thr Val Gly Glu Arg Val Arg Ile Pro Ala
                340                       345                       350
Lys Tyr Leu Gly Tyr Pro Pro Pro Glu Ile Lys Trp Tyr Lys Asn Gly
                355                       360                       365
Ile Pro Leu Glu Ser Asn His Thr Ile Lys Ala Gly His Val Leu Thr
                370                       375                       380
Ile Met Glu Val Ser Glu Arg Asp Thr Gly Asn Tyr Thr Val Ile Leu
385                       390                       395                       400
Thr Asn Pro Ile Ser Lys Glu Lys Gln Ser His Val Val Ser Leu Val
                405                       410                       415
Val Tyr Val Pro Pro Gln Ile Gly Glu Lys Ser Leu Ile Ser Pro Val
                420                       425                       430
Asp Ser Tyr Gln Tyr Gly Thr Thr Gln Thr Leu Thr Cys Thr Val Tyr
                435                       440                       445
Ala Ile Pro Pro Pro His His Ile His Trp Tyr Trp Gln Leu Glu Glu
                450                       455                       460
Glu Cys Ala Asn Glu Pro Ser Gln Ala Val Ser Val Thr Asn Pro Tyr
465                       470                       475                       480
Pro Cys Glu Glu Trp Arg Ser Val Glu Asp Phe Gln Gly Gly Asn Lys
                485                       490                       495
Ile Glu Val Asn Lys Asn Gln Phe Ala Leu Ile Glu Gly Lys Asn Lys
```

```
                500                     505                     510
Thr Val Ser Thr Leu Val Ile Gln Ala Ala Asn Val Ser Ala Leu Tyr
        515                     520                     525
Lys Cys Glu Ala Val Asn Lys Val Gly Arg Gly Glu Arg Val Ile Ser
    530                     535                     540
Phe His Val Thr Arg Gly Pro Glu Ile Thr Leu Gln Pro Asp Met Gln
545                     550                     555                     560
Pro Thr Glu Gln Glu Ser Val Ser Leu Trp Cys Thr Ala Asp Arg Ser
                565                     570                     575
Thr Phe Glu Asn Leu Thr Trp Tyr Lys Leu Gly Pro Gln Pro Leu Pro
            580                     585                     590
Ile His Val Gly Glu Leu Pro Thr Pro Val Cys Lys Asn Leu Asp Thr
            595                     600                     605
Leu Trp Lys Leu Asn Ala Thr Met Phe Ser Asn Ser Thr Asn Asp Ile
    610                     615                     620
Leu Ile Met Glu Leu Lys Asn Ala Ser Leu Gln Asp Gln Gly Asp Tyr
625                     630                     635                     640
Val Cys Leu Ala Gln Asp Arg Lys Thr Lys Lys Arg His Cys Val Val
                645                     650                     655
Arg Gln Leu Thr Val Leu Glu Arg Val Ala Pro Thr Ile Thr Gly Asn
            660                     665                     670
Leu Glu Asn Gln Thr Thr Ser Ile Gly Glu Ser Ile Glu Val Ser Cys
            675                     680                     685
Thr Ala Ser Gly Asn Pro Pro Pro Gln Ile Met Trp Phe Lys Asp Asn
    690                     695                     700
Glu Thr Leu Val Glu Asp Ser Gly Ile Val Leu Lys Asp Gly Asn Arg
705                     710                     715                     720
Asn Leu Thr Ile Arg Arg Val Arg Lys Glu Asp Glu Gly Leu Tyr Thr
                725                     730                     735
Cys Gln Ala Cys Ser Val Leu Gly Cys Ala Lys Val Glu Ala Phe Phe
            740                     745                     750
Ile Ile Glu Gly Ala Gln Glu Lys Thr Asn Leu Glu Ile Ile Ile Leu
            755                     760                     765
Val Gly Thr Ala Val Ile Ala Met Phe Phe Trp Leu Leu Leu Val Ile
    770                     775                     780
Ile Leu Arg Thr Val Lys Arg Ala Asn Gly Gly Glu Leu Lys Thr Gly
785                     790                     795                     800
Tyr Leu Ser Ile Val Met Asp Pro Asp Glu Leu Pro Leu Asp Glu His
                805                     810                     815
Cys Glu Arg Leu Pro Tyr Asp Ala Ser Lys Trp Glu Phe Pro Arg Asp
            820                     825                     830
Arg Leu Lys Leu Gly Lys Pro Leu Gly Arg Gly Ala Phe Gly Gln Val
    835                     840                     845
Ile Glu Ala Asp Ala Phe Gly Ile Asp Lys Thr Ala Thr Cys Arg Thr
    850                     855                     860
Val Ala Val Lys Met Leu Lys Glu Gly Ala Thr His Ser Glu His Arg
865                     870                     875                     880
Ala Leu Met Ser Glu Leu Lys Ile Leu Ile His Ile Gly His His Leu
                885                     890                     895
Asn Val Val Asn Leu Leu Gly Ala Cys Thr Lys Pro Gly Gly Pro Leu
            900                     905                     910
Met Val Ile Val Glu Phe Cys Lys Phe Gly Asn Leu Ser Thr Tyr Leu
            915                     920                     925
Arg Ser Lys Arg Asn Glu Phe Val Pro Tyr Lys Thr Lys Gly Ala Arg
```

```
        930                     935                     940
Phe Arg Gln Gly Lys Asp Tyr Val Gly Ala Ile Pro Val Asp Leu Lys
945                     950                     955                     960
Arg Arg Leu Asp Ser Ile Thr Ser Ser Gln Ser Ser Ala Ser Ser Gly
                    965                     970                     975
Phe Val Glu Glu Lys Ser Leu Ser Asp Val Glu Glu Glu Glu Ala Pro
                    980                     985                     990
Glu Asp Leu Tyr Lys Asp Phe Leu Thr Leu Glu His Leu Ile Cys Tyr
                    995                     1000                    1005
Ser Phe Gln Val Ala Lys Gly Met Glu Phe Leu Ala Ser Arg Lys Cys
        1010                    1015                    1020
Ile His Arg Asp Leu Ala Ala Arg Asn Ile Leu Leu Ser Glu Lys Asn
1025                    1030                    1035                    1040
Val Val Lys Ile Cys Asp Phe Gly Leu Ala Arg Asp Ile Tyr Lys Asp
                    1045                    1050                    1055
Pro Asp Tyr Val Arg Lys Gly Asp Ala Arg Leu Pro Leu Lys Trp Met
                    1060                    1065                    1070
Ala Pro Glu Thr Ile Phe Asp Arg Val Tyr Thr Ile Gln Ser Asp Val
                    1075                    1080                    1085
Trp Ser Phe Gly Val Leu Leu Trp Glu Ile Phe Ser Leu Gly Ala Ser
                    1090                    1095                    1100
Pro Tyr Pro Gly Val Lys Ile Asp Glu Glu Phe Cys Arg Arg Leu Lys
1105                    1110                    1115                    1120
Glu Gly Thr Arg Met Arg Ala Pro Asp Tyr Thr Thr Pro Glu Met Tyr
                    1125                    1130                    1135
Gln Thr Met Leu Asp Cys Trp His Gly Glu Pro Ser Gln Arg Pro Thr
                    1140                    1145                    1150
Phe Ser Glu Leu Val Glu His Leu Gly Asn Leu Leu Gln Ala Asn Ala
                    1155                    1160                    1165
Gln Gln Asp Gly Lys Asp Tyr Ile Val Leu Pro Ile Ser Glu Thr Leu
        1170                    1175                    1180
Ser Met Glu Glu Asp Ser Gly Leu Ser Leu Pro Thr Ser Pro Val Ser
1185                    1190                    1195                    1200
Cys Met Glu Glu Glu Glu Val Cys Asp Pro Lys Phe His Tyr Asp Asn
                    1205                    1210                    1215
Thr Ala Gly Ile Ser Gln Tyr Leu Gln Asn Ser Lys Arg Lys Ser Arg
        1220                    1225                    1230
Pro Val Ser Val Lys Thr Phe Glu Asp Ile Pro Leu Glu Glu Pro Glu
        1235                    1240                    1245
Val Lys Val Ile Pro Asp Asp Asn Gln Thr Asp Ser Gly Met Val Leu
        1250                    1255                    1260
Ala Ser Glu Glu Leu Lys Thr Leu Glu Asp Arg Thr Lys Leu Ser Pro
1265                    1270                    1275                    1280
Ser Phe Gly Gly Met Val Pro Ser Lys Ser Arg Glu Ser Val Ala Ser
                    1285                    1290                    1295
Glu Gly Ser Asn Gln Thr Ser Gly Tyr Gln Ser Gly Tyr His Ser Asp
                    1300                    1305                    1310
Asp Thr Asp Thr Thr Val Tyr Ser Ser Glu Glu Ala Glu Leu Leu Lys
        1315                    1320                    1325
Leu Ile Glu Ile Gly Val Gln Thr Gly Ser Thr Ala Gln Ile Leu Gln
        1330                    1335                    1340
Pro Asp Ser Gly Thr Thr Leu Ser Ser Pro Pro Val
1345                    1350                    1355
```

<210> 3
<211> 4017
<212> DNA
<213> human

<400> 3
```
atggtcagct actgggacac cggggtcctg ctgtgcgcgc tgctcagctg tctgcttctc 60
acaggatcta gttcaggttc aaaattaaaa gatcctgaac tgagtttaaa aggcacccag 120
cacatcatgc aagcaggcca gacactgcat ctccaatgca ggggggaagc agcccataaa 180
tggtctttgc ctgaaatggt gagtaaggaa agcgaaaggc tgagcataac taaatctgcc 240
tgtggaagaa atggcaaaca attctgcagt actttaacct tgaacacagc tcaagcaaac 300
cacactggct ctacagctg caaatatcta gctgtaccta cttcaaagaa gaaggaaaca 360
gaatctgcaa tctatatatt tattagtgat acaggtagac ctttcgtaga gatgtacagt 420
gaaatccccg aaattataca catgactgaa ggaagggagc tcgtcattcc ctgccgggtt 480
acgtcaccta acatcactgt tactttaaaa aagtttccac ttgacacttt gatccctgat 540
ggaaaacgca taatctggga cagtagaaag ggcttcatca tatcaaatgc aacgtacaaa 600
gaaatagggc ttctgacctg tgaagcaaca gtcaatgggc atttgtataa gacaaactat 660
ctcacacatc gacaaaccaa tacaatcata gatgtccaaa taagcacacc acgcccagtc 720
aaattactta gaggccatac tcttgtcctc aattgtactg ctaccactcc cttgaacacg 780
agagttcaaa tgacctggag ttaccctgat gaaaaaaata gagagcttc cgtaaggcga 840
cgaattgacc aaagcaattc ccatgccaac atattctaca gtgttcttac tattgacaaa 900
atgcagaaca agacaaaagg actttatact tgtcgtgtaa ggagtggacc atcattcaaa 960
tctgttaaca cctcagtgca tatatatgat aaagcattca tcactgtgaa acatcgaaaa 1020
cagcaggtgc ttgaaaccgt agctggcaag cggtcttacc ggctctctat gaaagtgaag 1080
gcatttccct cgccggaagt tgtatggtta aaagatgggt tacctgcgac tgagaaatct 1140
gctcgctatt tgactcgtgg ctactcgtta attatcaagg acgtaactga agaggatgca 1200
gggaattata caatcttgct gagcataaaa cagtcaaatg tgtttaaaaa cctcactgcc 1260
actctaattg tcaatgtgaa accccagatt tacgaaaagg ccgtgtcatc gtttccagac 1320
ccggctctct acccactggg cagcagacaa atcctgactt gtaccgcata tggtatccct 1380
caacctacaa tcaagtggtt ctggcacccc tgtaaccata atcattccga agcaaggtgt 1440
gactttgtt ccaataatga agagtccttt atcctggatg ctgacagcaa catgggaaac 1500
agaattgaga gcatcactca gcgcatggca ataatagaag gaaagaataa gatggctagc 1560
accttggttg tggctgactc tagaatttct ggaatctaca tttgcatagc ttccaataaa 1620
gttgggactg tgggaagaaa cataagcttt tatatcacag atgtgccaaa tgggtttcat 1680
gttaacttgg aaaaaatgcc gacggaagga gaggacctga aactgtcttg cacagttaac 1740
aagttcttat acagagacgt tacttggatt ttactgcgga cagttaataa cagaacaatg 1800
cactacagta ttagcaagca aaaaatggcc atcactaagg agcactccat cactcttaat 1860
cttaccatca tgaatgtttc cctgcaagat tcaggcacct atgcctgcag agccaggaat 1920
gtatacacag gggaagaaat cctccagaag aaagaaatta caatcagaga tcaggaagca 1980
ccatcctcc tgcgaaacct cagtgatcac acagtggcca tcagcagttc caccacttta 2040
gactgtcatg ctaatggtgt ccccgagcct cagatcactt ggtttaaaaa caaccacaaa 2100
atacaacaag agcctggaat tatttaggga ccaggaagca gcacgctgtt tattgaaaga 2160
gtcacagaag aggatgaagg tgtctatcac tgcaaagcca ccaaccagaa gggctctgtg 2220
gaaagttcag catacctcac tgttcaagga acctcggaca gtctaatcta ggagctgatc 2280
actctaacat gcacctgtgt ggctgcgact ctcttctggc tcctattaac cctctttatc 2340
cgaaaaatga aaggtcttc ttctgaaata aagactgact acctatcaat tataatggac 2400
ccagatgaag ttcctttgga tgagcagtgt gagcggctcc cttatgatgc cagcaagtgg 2460
gagtttgccc gggagagact aaactgggc aaatcacttg aagaggggc ttttggaaaa 2520
gtggttcaag catcagcatt tggcattaag aaatcaccta cgtgccggac tgtggctgtg 2580
aaaatgctga agagggggc cacggccagc gagtacaaag ctctgatgac tgagctaaaa 2640
atcttgaccc acattggcca ccatctgaac gtggttaacc tgctgggagc ctgcaccaag 2700
caaggagggc ctctgatggt gattgttgaa tactgcaaat atggaaatct ctccaactac 2760
ctcaagagca acgtgactt attttttctc aacaaggatg cagcactaca catggagcct 2820
aagaaagaaa aaatggagcc aggcctggaa caaggcaaga aaccaagact agatagcgtc 2880
```

```
accagcagcg aaagctttgc gagctccggc tttcaggaag ataaaagtct gagtgatgtt 2940
gaggaagagg aggattctga cggtttctac aaggagccca tcactatgga agatctgatt 3000
tcttacagtt ttcaagtggc cagaggcatg gagttcctgt cttccagaaa gtgcattcat 3060
cgggacctgg cagcgagaaa cattctttta tctgagaaca cgtggtgaa gatttgtgat 3120
tttggccttg cccgggatat ttataagaac cccgattatg tgagaaaagg agatactcga 3180
cttcctctga aatggatggc tcctgaatct atctttgaca aaatctacag caccaagagc 3240
gacgtgtggt cttacggagt attgctgtgg gaaatcttct ccttaggtgg gtctccatac 3300
ccaggagtac aaatggatga ggacttttgc agtcgcctga gggaaggcat gaggatgaga 3360
gctcctgagt actctactcc tgaaatctat cagatcatgc tggactgctg gcacagagac 3420
ccaaaagaaa ggccaagatt tgcagaactt gtggaaaaac taggtgattt gcttcaagca 3480
aatgtacaac aggatggtaa agactacatc ccaatcaatg ccatactgac aggaaatagt 3540
gggtttacat actcaactcc tgccttctct gaggacttct tcaaggaaag tatttcagct 3600
ccgaagttta attcaggaag ctctgatgat gtcagatatg taaatgcttt caagttcatg 3660
agcctggaaa gaatcaaaac cttttgaagaa cttttaccga atgccacctc catgtttgat 3720
gactaccagg cgacagcag cactctgttg gcctctccca tgctgaagcg cttcacctgg 3780
actgacagca aacccaaggc ctcgctcaag attgacttga gagtaaccag taaaagtaag 3840
gagtcggggc tgtctgatgt cagcaggccc agtttctgcc attccagctg tgggcacgtc 3900
agcgaaggca agcgcaggtt cacctacgac cacgctgagc tggaaaggaa aatcgcgtgc 3960
tgctccccgc ccccagacta caactcggtg gtcctgtact ccacccccacc catctag   4017
```

<210> 4
<211> 1338
<212> PRT
<213> human

<400> 4

```
Met Val Ser Tyr Trp Asp Thr Gly Val Leu Leu Cys Ala Leu Leu Ser
1               5                   10                  15
Cys Leu Leu Leu Thr Gly Ser Ser Ser Gly Ser Lys Leu Lys Asp Pro
            20                  25                  30
Glu Leu Ser Leu Lys Gly Thr Gln His Ile Met Gln Ala Gly Gln Thr
        35                  40                  45
Leu His Leu Gln Cys Arg Gly Glu Ala Ala His Lys Trp Ser Leu Pro
    50                  55                  60
Glu Met Val Ser Lys Glu Ser Glu Arg Leu Ser Ile Thr Lys Ser Ala
65                  70                  75                  80
Cys Gly Arg Asn Gly Lys Gln Phe Cys Ser Thr Leu Thr Leu Asn Thr
                85                  90                  95
Ala Gln Ala Asn His Thr Gly Phe Tyr Ser Cys Lys Tyr Leu Ala Val
            100                 105                 110
Pro Thr Ser Lys Lys Lys Glu Thr Glu Ser Ala Ile Tyr Ile Phe Ile
        115                 120                 125
Ser Asp Thr Gly Arg Pro Phe Val Glu Met Tyr Ser Glu Ile Pro Glu
    130                 135                 140
Ile Ile His Met Thr Glu Gly Arg Glu Leu Val Ile Pro Cys Arg Val
145                 150                 155                 160
Thr Ser Pro Asn Ile Thr Val Thr Leu Lys Lys Phe Pro Leu Asp Thr
                165                 170                 175
Leu Ile Pro Asp Gly Lys Arg Ile Ile Trp Asp Ser Arg Lys Gly Phe
            180                 185                 190
Ile Ile Ser Asn Ala Thr Tyr Lys Glu Ile Gly Leu Leu Thr Cys Glu
        195                 200                 205
Ala Thr Val Asn Gly His Leu Tyr Lys Thr Asn Tyr Leu Thr His Arg
    210                 215                 220
```

```
Gln Thr Asn Thr Ile Ile Asp Val Gln Ile Ser Thr Pro Arg Pro Val
225                 230             235             240
Lys Leu Leu Arg Gly His Thr Leu Val Leu Asn Cys Thr Ala Thr Thr
                245             250             255
Pro Leu Asn Thr Arg Val Gln Met Thr Trp Ser Tyr Pro Asp Glu Lys
                260             265             270
Asn Lys Arg Ala Ser Val Arg Arg Ile Asp Gln Ser Asn Ser His
            275             280             285
Ala Asn Ile Phe Tyr Ser Val Leu Thr Ile Asp Lys Met Gln Asn Lys
    290             295             300
Asp Lys Gly Leu Tyr Thr Cys Arg Val Arg Ser Gly Pro Ser Phe Lys
305             310             315             320
Ser Val Asn Thr Ser Val His Ile Tyr Asp Lys Ala Phe Ile Thr Val
                325             330             335
Lys His Arg Lys Gln Gln Val Leu Glu Thr Val Ala Gly Lys Arg Ser
            340             345             350
Tyr Arg Leu Ser Met Lys Val Lys Ala Phe Pro Ser Pro Glu Val Val
    355             360             365
Trp Leu Lys Asp Gly Leu Pro Ala Thr Glu Lys Ser Ala Arg Tyr Leu
    370             375             380
Thr Arg Gly Tyr Ser Leu Ile Ile Lys Asp Val Thr Glu Glu Asp Ala
385             390             395             400
Gly Asn Tyr Thr Ile Leu Leu Ser Ile Lys Gln Ser Asn Val Phe Lys
                405             410             415
Asn Leu Thr Ala Thr Leu Ile Val Asn Val Lys Pro Gln Ile Tyr Glu
            420             425             430
Lys Ala Val Ser Ser Phe Pro Asp Pro Ala Leu Tyr Pro Leu Gly Ser
            435             440             445
Arg Gln Ile Leu Thr Cys Thr Ala Tyr Gly Ile Pro Gln Pro Thr Ile
    450             455             460
Lys Trp Phe Trp His Pro Cys Asn His Asn His Ser Glu Ala Arg Cys
465             470             475             480
Asp Phe Cys Ser Asn Asn Glu Glu Ser Phe Ile Leu Asp Ala Asp Ser
                485             490   ·         495
Asn Met Gly Asn Arg Ile Glu Ser Ile Thr Gln Arg Met Ala Ile Ile
            500             505             510
Glu Gly Lys Asn Lys Met Ala Ser Thr Leu Val Val Ala Asp Ser Arg
            515             520             525
Ile Ser Gly Ile Tyr Ile Cys Ile Ala Ser Asn Lys Val Gly Thr Val
    530             535             540
Gly Arg Asn Ile Ser Phe Tyr Ile Thr Asp Val Pro Asn Gly Phe His
545             550             555             560
Val Asn Leu Glu Lys Met Pro Thr Glu Gly Glu Asp Leu Lys Leu Ser
                565             570             575
Cys Thr Val Asn Lys Phe Leu Tyr Arg Asp Val Thr Trp Ile Leu Leu
            580             585             590
Arg Thr Val Asn Asn Arg Thr Met His Tyr Ser Ile Ser Lys Gln Lys
        595             600             605
Met Ala Ile Thr Lys Glu His Ser Ile Thr Leu Asn Leu Thr Ile Met
    610             615             620
Asn Val Ser Leu Gln Asp Ser Gly Thr Tyr Ala Cys Arg Ala Arg Asn
625             630             635             640
Val Tyr Thr Gly Glu Glu Ile Leu Gln Lys Lys Glu Ile Thr Ile Arg
            645             650             655
```

```
Asp Gln Glu Ala Pro Tyr Leu Leu Arg Asn Leu Ser Asp His Thr Val
        660                 665             670
Ala Ile Ser Ser Ser Thr Thr Leu Asp Cys His Ala Asn Gly Val Pro
        675             680                 685
Glu Pro Gln Ile Thr Trp Phe Lys Asn Asn His Lys Ile Gln Gln Glu
    690                 695             700
Pro Gly Ile Ile Leu Gly Pro Gly Ser Ser Thr Leu Phe Ile Glu Arg
705                 710             715                 720
Val Thr Glu Glu Asp Glu Gly Val Tyr His Cys Lys Ala Thr Asn Gln
            725                 730                 735
Lys Gly Ser Val Glu Ser Ser Ala Tyr Leu Thr Val Gln Gly Thr Ser
        740                 745                 750
Asp Lys Ser Asn Leu Glu Leu Ile Thr Leu Thr Cys Thr Cys Val Ala
        755             760                 765
Ala Thr Leu Phe Trp Leu Leu Leu Thr Leu Phe Ile Arg Lys Met Lys
    770             775                 780
Arg Ser Ser Ser Glu Ile Lys Thr Asp Tyr Leu Ser Ile Ile Met Asp
785                 790                 795                 800
Pro Asp Glu Val Pro Leu Asp Glu Gln Cys Glu Arg Leu Pro Tyr Asp
            805                 810                 815
Ala Ser Lys Trp Glu Phe Ala Arg Glu Arg Leu Lys Leu Gly Lys Ser
        820                 825                 830
Leu Gly Arg Gly Ala Phe Gly Lys Val Val Gln Ala Ser Ala Phe Gly
        835                 840                 845
Ile Lys Lys Ser Pro Thr Cys Arg Thr Val Ala Val Lys Met Leu Lys
    850                 855                 860
Glu Gly Ala Thr Ala Ser Glu Tyr Lys Ala Leu Met Thr Glu Leu Lys
865                 870                 875                 880
Ile Leu Thr His Ile Gly His His Leu Asn Val Val Asn Leu Leu Gly
            885                 890                 895
Ala Cys Thr Lys Gln Gly Gly Pro Leu Met Val Ile Val Glu Tyr Cys
        900                 905                 910
Lys Tyr Gly Asn Leu Ser Asn Tyr Leu Lys Ser Lys Arg Asp Leu Phe
        915                 920                 925
Phe Leu Asn Lys Asp Ala Ala Leu His Met Glu Pro Lys Lys Glu Lys
    930             935                 940
Met Glu Pro Gly Leu Glu Gln Gly Lys Lys Pro Arg Leu Asp Ser Val
945             950                 955                 960
Thr Ser Ser Glu Ser Phe Ala Ser Ser Gly Phe Gln Glu Asp Lys Ser
            965                 970                 975
Leu Ser Asp Val Glu Glu Glu Asp Ser Asp Gly Phe Tyr Lys Glu
            980                 985                 990
Pro Ile Thr Met Glu Asp Leu Ile Ser Tyr Ser Phe Gln Val Ala Arg
        995             1000                1005
Gly Met Glu Phe Leu Ser Ser Arg Lys Cys Ile His Arg Asp Leu Ala
    1010                1015                1020
Ala Arg Asn Ile Leu Leu Ser Glu Asn Asn Val Val Lys Ile Cys Asp
1025                1030                1035                1040
Phe Gly Leu Ala Arg Asp Ile Tyr Lys Asn Pro Asp Tyr Val Arg Lys
            1045                1050                1055
Gly Asp Thr Arg Leu Pro Leu Lys Trp Met Ala Pro Glu Ser Ile Phe
            1060                1065                1070
Asp Lys Ile Tyr Ser Thr Lys Ser Asp Val Trp Ser Tyr Gly Val Leu
        1075                1080                1085
```

```
Leu Trp Glu Ile Phe Ser Leu Gly Gly Ser Pro Tyr Pro Gly Val Gln
    1090                1095                1100
Met Asp Glu Asp Phe Cys Ser Arg Leu Arg Glu Gly Met Arg Met Arg
1105                     1110                1115                1120
Ala Pro Glu Tyr Ser Thr Pro Glu Ile Tyr Gln Ile Met Leu Asp Cys
                1125                1130                1135
Trp His Arg Asp Pro Lys Glu Arg Pro Arg Phe Ala Glu Leu Val Glu
                1140                1145                1150
Lys Leu Gly Asp Leu Leu Gln Ala Asn Val Gln Gln Asp Gly Lys Asp
        1155                1160                1165
Tyr Ile Pro Ile Asn Ala Ile Leu Thr Gly Asn Ser Gly Phe Thr Tyr
    1170                1175                1180
Ser Thr Pro Ala Phe Ser Glu Asp Phe Phe Lys Glu Ser Ile Ser Ala
1185                1190                1195                1200
Pro Lys Phe Asn Ser Gly Ser Ser Asp Asp Val Arg Tyr Val Asn Ala
                1205                1210                1215
Phe Lys Phe Met Ser Leu Glu Arg Ile Lys Thr Phe Glu Glu Leu Leu
                1220                1225                1230
Pro Asn Ala Thr Ser Met Phe Asp Asp Tyr Gln Gly Asp Ser Ser Thr
            1235                1240                1245
Leu Leu Ala Ser Pro Met Leu Lys Arg Phe Thr Trp Thr Asp Ser Lys
    1250                1255                1260
Pro Lys Ala Ser Leu Lys Ile Asp Leu Arg Val Thr Ser Lys Ser Lys
1265                1270                1275                1280
Glu Ser Gly Leu Ser Asp Val Ser Arg Pro Ser Phe Cys His Ser Ser
                1285                1290                1295
Cys Gly His Val Ser Glu Gly Lys Arg Arg Phe Thr Tyr Asp His Ala
            1300                1305                1310
Glu Leu Glu Arg Lys Ile Ala Cys Cys Ser Pro Pro Pro Asp Tyr Asn
    1315                1320                1325
Ser Val Val Leu Tyr Ser Thr Pro Pro Ile
    1330                1335
```

```
<210> 5
<211> 5390
<212> DNA
<213> mouse

<400> 5
ctgtgtcccg cagccggata acctggctga cccgattccg cggacaccgc tgcagccgcg 60
gctggagcca gggcgccggt gccccgcgct ctccccggtc ttgcgctgcg ggggccatac 120
cgcctctgtg acttctttgc gggccaggga cggagaagga gtctgtgcct gagaaactgg 180
gctctgtgcc caggcgcgag gtgcaggatg gagagcaagg cgctgctagc tgtcgctctg 240
tggttctgcg tggagacccg agccgcctct gtgggtttga ctggcgattt tctccatccc 300
cccaagctca gcacacagaa agacatactg acaattttgg caaatacaac ccttcagatt 360
acttgcaggg gacagcggga cctggactgg ctttggccca atgctcagcg tgattctgag 420
gaaagggtat tggtgactga atgcggcggt ggtgacagta tcttctgcaa aacactcacc 480
attcccaggg tggttggaaa tgatactgga gcctacaagt gctcgtaccg ggacgtcgac 540
atagcctcca ctgtttatgt ctatgttcga gattacagat caccattcat cgcctctgtc 600
agtgaccagc atggcatcgt gtacatcacc gagaacaaga caaaactgt ggtgatcccc 660
tgccgagggt cgatttcaaa cctcaatgtg tctctttgcg ctaggtatcc agaaaagaga 720
tttgttccgg atggaaacag aatttcctgg gacagcgaga taggctttac tctccccagt 780
tacatgatca gctatgccgg catggtcttc tgtgaggcaa agatcaatga tgaaacctat 840
```

```
cagtctatca tgtacatagt tgtggttgta ggatatagga tttatgatgt gattctgagc  900
cccccgcatg aaattgagct atctgccgga gaaaaacttg tcttaaattg tacagcgaga  960
acagagctca atgtggggct tgatttcacc tggcactctc caccttcaaa gtctcatcat 1020
aagaagattg taaaccggga tgtgaaaccc tttcctggga ctgtggcgaa gatgtttttg 1080
agcaccttga caatagaaag tgtgaccaag agtgaccaag gggaatacac ctgtgtagcg 1140
tccagtggac ggatgatcaa gagaaataga acatttgtcc gagttcacac aaagcctttt 1200
attgctttcg gtagtgggat gaaatctttg gtggaagcca cagtgggcag tcaagtccga 1260
atccctgtga agtatctcag ttacccagct cctgatatca aatggtacag aaatggaagg 1320
cccattgagt ccaactacac aatgattgtt ggcgatgaac tcaccatcat ggaagtgact 1380
gaaagagatg caggaaacta cacggtcatc ctcaccaacc ccatttcaat ggagaaacag 1440
agccacatgg tctctctggt tgtgaatgtc cacccccaga tcggtgagaa agccttgatc 1500
tcgcctatgg attcctacca gtatgggacc atgcagacat tgacatgcac agtctacgcc 1560
aaccctcccc tgcaccacat ccagtggtac tggcagctag aagaagcctg ctcctacaga 1620
cccggccaaa caagcccgta tgcttgtaaa gaatggagac acgtggagga tttccagggg 1680
ggaaacaaga tcgaagtcac caaaaaccaa tatgccctga ttgaaggaaa aaacaaaact 1740
gtaagtacgc tggtcatcca agctgccaac gtgtcagcgt tgtacaaatg tgaagccatc 1800
aacaaagcgg gacgaggaga gagggtcatc tccttccatg tgatcagggg tcctgaaatt 1860
actgtgcaac ctgctgccca gccaactgag caggagagtg tgtccctgtt gtgcactgca 1920
gacagaaata cgtttgagaa cctcacgtgg tacaagcttg gctcacaggc aacatcggtc 1980
cacatgggcg aatcactcac accagtttgc aagaacttgg atgctctttg gaaactgaat 2040
ggcaccatgt tttctaacag cacaaatgac atcttgattg tggcatttca gaatgcctct 2100
ctgcaggacc aaggcgacta tgtttgctct gctcaagata agaagaccaa gaaaagacat 2160
tgcctggtca aacagctcat catcctagag cgcatggcac ccatgatcac cggaaatctg 2220
gagaatcaga caacaaccat tggcgagacc attgaagtga cttgcccagc atctggaaat 2280
cctaccccac acattacatg gttcaaagac aacgagaccc tggtagaaga ttcaggcatt 2340
gtactgagag atgggaaccg gaacctgact atccgcaggg tgaggaagga ggatggaggc 2400
ctctacacct gccaggcctg caatgtcctt ggctgtgcaa gagcggagac gctcttcata 2460
atagaaggtg cccaggaaaa gaccaacttg gaagtcatta tcctcgtcgg cactgcagtg 2520
attgccatgt tcttctggct ccttcttgtc attgtcctac ggaccgttaa gcgggccaat 2580
gaaggggaac tgaagacagg ctacttgtct attgtcatgg atccagatga attgcccttg 2640
gatgagcgct gtgaacgctt gccttatgat gccagcaagt gggaattccc cagggaccgg 2700
ctgaaactag aaaaacctct tggccgcggt gccttcggcc aagtgattga ggcagacgct 2760
tttggaattg acaagacagc gacttgcaaa acagtagccg tcaagatgtt gaaagaagga 2820
gcaacacaca gcgagcatcg agccctcatg tctgaactca agatcctcat ccacattggt 2880
caccatctca atgtggtgaa cctcctaggc gcctgcacca agccgggagg gcctctcatg 2940
gtgattgtgg aattctgcaa gtttggaaac ctatcaactt acttacgggg caagagaaat 3000
gaatttgttc cctataagag caaaggggca cgcttccgcc agggcaagga ctacgttggg 3060
gagctctccg tggatctgaa aagacgcttg gacagcatca ccagcagcca gagctctgcc 3120
agctcaggct ttgttgagga gaaatcgctc agtgatgtag aggaagaaga gcttctgaa 3180
gaactgtaca aggacttcct gaccttggag catctcatct gttacagctt ccaagtggct 3240
aagggcatgg agttcttggc atcaaggaag tgtatccaca gggacctggc agcacgaaac 3300
attctcctat cggagaagaa tgtggttaag atctgtgact cggcttggc ccggacatt 3360
tataaagacc cggattatgt cagaaaagga gatgcccgac tcccttgaa gtggatggcc 3420
ccggaaacca tttttgacag agtatacaca attcagagcg atgtgtggtc tttcggtgtg 3480
ttgctctggg aaatattttc cttaggtgcc tccccatacc ctggggtcaa gattgatgaa 3540
gaattttgta ggagattgaa agaaggaact agaatgcggg ctcctgacta cactaccca 3600
gaaatgtacc agaccatgct ggactgctgg catgaggacc ccaaccagag accctcgttt 3660
tcagagttgg tggagcattt gggaaacctc ctgcaagcaa atgcgcagca ggatggcaaa 3720
gactatattg ttcttccaat gtcagagaca ctgagcatgg aagaggattc tggactctcc 3780
ctgcctacct cacctgtttc ctgtatggag gaagaggaag tgtgcgaccc caaattccat 3840
tatgacaaca cagcaggaat cagtcattat ctccagaaca gtaagcgaaa gagccggcca 3900
gtgagtgtaa aaacatttga agatatccca ttggaggaac cagaagtaaa agtgatccca 3960
gatgacagcc agacagacag tgggatggtc cttgcatcag aagagctgaa aactctggaa 4020
gacaggaaca aattatctcc atcttttggt ggaatgatgc ccagtaaaag cagggagtct 4080
```

```
gtggcctcgg aaggctccaa ccagaccagt ggctaccagt ctgggtatca ctcagatgac 4140
acagacacca ccgtgtactc cagcgacgag gcaggacttt taaagatggt ggatgctgca 4200
gttcacgctg actcagggac cacactgcgc tcacctcctg tttaaatgga agtggtcctg 4260
tcccggctcc gcccccaact cctggaaatc acgagagagg tgctgcttag attttcaagt 4320
gttgttcttt ccaccacccg gaagtagcca catttgattt tcatttttgg aggagggacc 4380
tcagactgca aggagcttgt cctcagggca tttccagaga agatgcccat gacccaagaa 4440
tgtgttgact ctactctctt ttccattcat ttaaaagtcc tatataatgt gccctgctgt 4500
ggtctcacta ccagttaaag caaaagactt tcaaacacgt ggactctgtc ctccaagaag 4560
tggcaacggc acctctgtga aactggatcg aatgggcaat gctttgtgtg ttgaggatgg 4620
gtgagatgtc ccaggccga gtctgtctac cttggaggct ttgtggagga tgcggctatg 4680
agccaagtgt taagtgtggg atgtggactg ggaggaagga aggcgcaagt cgctcggaga 4740
gcggttggag cctgcagatg cattgtgctg gctctggtgg aggtgggctt gtggcctgtc 4800
aggaaacgca aaggcggccg gcagggtttg gttttggaag gtttgcgtgc tcttcacagt 4860
cgggttacag gcgagttccc tgtggcgttt cctactccta atgagagttc cttccggact 4920
cttacgtgtc tcctggcctg gccccaggaa ggaaatgatg cagcttgctc cttcctcatc 4980
tctcaggctg tgccttaatt cagaacacca aaagagagga acgtcggcag aggctcctga 5040
cggggccgaa gaattgtgag aacagaacag aaactcaggg tttctgctgg gtggagaccc 5100
acgtggcgcc ctggtggcag gtctgagggt tctctgtcaa gtggcggtaa aggctcaggc 5160
tggtgttctt cctctatctc cactcctgtc aggcccccaa gtcctcagta ttttagcttt 5220
gtggcttcct gatggcagaa aaatcttaat tggttggttt gctctccaga taatcactag 5280
ccagatttcg aaattacttt ttagccgagg ttatgataac atctactgta tcctttagaa 5340
ttttaaccta taaaactatg tctactggtt tctgcctgtg tgcttatgtt      5390
```

<210> 6
<211> 1345
<212> PRT
<213> mouse

<400> 6
```
Met Glu Ser Lys Ala Leu Leu Ala Val Ala Leu Trp Phe Cys Val Glu
 1               5                  10                  15
Thr Arg Ala Ala Ser Val Gly Leu Thr Gly Asp Phe Leu His Pro Pro
            20                  25                  30
Lys Leu Ser Thr Gln Lys Asp Ile Leu Thr Ile Leu Ala Asn Thr Thr
        35                  40                  45
Leu Gln Ile Thr Cys Arg Gly Gln Arg Asp Leu Asp Trp Leu Trp Pro
    50                  55                  60
Asn Ala Gln Arg Asp Ser Glu Glu Arg Val Leu Val Thr Glu Cys Gly
65                  70                  75                  80
Gly Gly Asp Ser Ile Phe Cys Lys Thr Leu Thr Ile Pro Arg Val Val
                85                  90                  95
Gly Asn Asp Thr Gly Ala Tyr Lys Cys Ser Tyr Arg Asp Val Asp Ile
            100                 105                 110
Ala Ser Thr Val Tyr Val Tyr Val Arg Asp Tyr Arg Ser Pro Phe Ile
        115                 120                 125
Ala Ser Val Ser Asp Gln His Gly Ile Val Tyr Ile Thr Glu Asn Lys
        130                 135                 140
Asn Lys Thr Val Val Ile Pro Cys Arg Gly Ser Ile Ser Asn Leu Asn
145                 150                 155                 160
Val Ser Leu Cys Ala Arg Tyr Pro Glu Lys Arg Phe Val Pro Asp Gly
                165                 170                 175
Asn Arg Ile Ser Trp Asp Ser Glu Ile Gly Phe Thr Leu Pro Ser Tyr
```

```
                 180                    185                    190
Met Ile Ser Tyr Ala Gly Met Val Phe Cys Glu Ala Lys Ile Asn Asp
         195                    200                    205
Glu Thr Tyr Gln Ser Ile Met Tyr Ile Val Val Val Gly Tyr Arg
     210                    215                    220
Ile Tyr Asp Val Ile Leu Ser Pro Pro His Glu Ile Glu Leu Ser Ala
225                    230                    235                    240
Gly Glu Lys Leu Val Leu Asn Cys Thr Ala Arg Thr Glu Leu Asn Val
                 245                    250                    255
Gly Leu Asp Phe Thr Trp His Ser Pro Pro Ser Lys Ser His His Lys
         260                    265                    270
Lys Ile Val Asn Arg Asp Val Lys Pro Phe Pro Gly Thr Val Ala Lys
         275                    280                    285
Met Phe Leu Ser Thr Leu Thr Ile Glu Ser Val Thr Lys Ser Asp Gln
     290                    295                    300
Gly Glu Tyr Thr Cys Val Ala Ser Ser Gly Arg Met Ile Lys Arg Asn
305                    310                    315                    320
Arg Thr Phe Val Arg Val His Thr Lys Pro Phe Ile Ala Phe Gly Ser
                 325                    330                    335
Gly Met Lys Ser Leu Val Glu Ala Thr Val Gly Ser Gln Val Arg Ile
         340                    345                    350
Pro Val Lys Tyr Leu Ser Tyr Pro Ala Pro Asp Ile Lys Trp Tyr Arg
         355                    360                    365
Asn Gly Arg Pro Ile Glu Ser Asn Tyr Thr Met Ile Val Gly Asp Glu
     370                    375                    380
Leu Thr Ile Met Glu Val Thr Glu Arg Asp Ala Gly Asn Tyr Thr Val
385                    390                    395                    400
Ile Leu Thr Asn Pro Ile Ser Met Glu Lys Gln Ser His Met Val Ser
                 405                    410                    415
Leu Val Val Asn Val Pro Pro Gln Ile Gly Glu Lys Ala Leu Ile Ser
         420                    425                    430
Pro Met Asp Ser Tyr Gln Tyr Gly Thr Met Gln Thr Leu Thr Cys Thr
         435                    440                    445
Val Tyr Ala Asn Pro Pro Leu His His Ile Gln Trp Tyr Trp Gln Leu
     450                    455                    460
Glu Glu Ala Cys Ser Tyr Arg Pro Gly Gln Thr Ser Pro Tyr Ala Cys
465                    470                    475                    480
Lys Glu Trp Arg His Val Glu Asp Phe Gln Gly Gly Asn Lys Ile Glu
                 485                    490                    495
Val Thr Lys Asn Gln Tyr Ala Leu Ile Glu Gly Lys Asn Lys Thr Val
         500                    505                    510
Ser Thr Leu Val Ile Gln Ala Ala Asn Val Ser Ala Leu Tyr Lys Cys
         515                    520                    525
Glu Ala Ile Asn Lys Ala Gly Arg Gly Glu Arg Val Ile Ser Phe His
     530                    535                    540
Val Ile Arg Gly Pro Glu Ile Thr Val Gln Pro Ala Ala Gln Pro Thr
545                    550                    555                    560
Glu Gln Glu Ser Val Ser Leu Leu Cys Thr Ala Asp Arg Asn Thr Phe
                 565                    570                    575
Glu Asn Leu Thr Trp Tyr Lys Leu Gly Ser Gln Ala Thr Ser Val His
         580                    585                    590
Met Gly Glu Ser Leu Thr Pro Val Cys Lys Asn Leu Asp Ala Leu Trp
         595                    600                    605
Lys Leu Asn Gly Thr Met Phe Ser Asn Ser Thr Asn Asp Ile Leu Ile
```

```
            610                     615                     620
Val Ala Phe Gln Asn Ala Ser Leu Gln Asp Gln Gly Asp Tyr Val Cys
625                     630                     635                     640
Ser Ala Gln Asp Lys Lys Thr Lys Lys Arg His Cys Leu Val Lys Gln
                    645                     650                     655
Leu Ile Ile Leu Glu Arg Met Ala Pro Met Ile Thr Gly Asn Leu Glu
                    660                     665                     670
Asn Gln Thr Thr Thr Ile Gly Glu Thr Ile Glu Val Thr Cys Pro Ala
                    675                     680                     685
Ser Gly Asn Pro Thr Pro His Ile Thr Trp Phe Lys Asp Asn Glu Thr
                    690                     695                     700
Leu Val Glu Asp Ser Gly Ile Val Leu Arg Asp Gly Asn Arg Asn Leu
705                     710                     715                     720
Thr Ile Arg Arg Val Arg Lys Glu Asp Gly Gly Leu Tyr Thr Cys Gln
                    725                     730                     735
Ala Cys Asn Val Leu Gly Cys Ala Arg Ala Glu Thr Leu Phe Ile Ile
                    740                     745                     750
Glu Gly Ala Gln Glu Lys Thr Asn Leu Glu Val Ile Ile Leu Val Gly
                    755                     760                     765
Thr Ala Val Ile Ala Met Phe Phe Trp Leu Leu Leu Val Ile Val Leu
                    770                     775                     780
Arg Thr Val Lys Arg Ala Asn Glu Gly Glu Leu Lys Thr Gly Tyr Leu
785                     790                     795                     800
Ser Ile Val Met Asp Pro Asp Glu Leu Pro Leu Asp Glu Arg Cys Glu
                    805                     810                     815
Arg Leu Pro Tyr Asp Ala Ser Lys Trp Glu Phe Pro Arg Asp Arg Leu
                    820                     825                     830
Lys Leu Gly Lys Pro Leu Gly Arg Gly Ala Phe Gly Gln Val Ile Glu
                    835                     840                     845
Ala Asp Ala Phe Gly Ile Asp Lys Thr Ala Thr Cys Lys Thr Val Ala
                    850                     855                     860
Val Lys Met Leu Lys Glu Gly Ala Thr His Ser Glu His Arg Ala Leu
865                     870                     875                     880
Met Ser Glu Leu Lys Ile Leu Ile His Ile Gly His His Leu Asn Val
                    885                     890                     895
Val Asn Leu Leu Gly Ala Cys Thr Lys Pro Gly Gly Pro Leu Met Val
                    900                     905                     910
Ile Val Glu Phe Cys Lys Phe Gly Asn Leu Ser Thr Tyr Leu Arg Gly
                    915                     920                     925
Lys Arg Asn Glu Phe Val Pro Tyr Lys Ser Lys Gly Ala Arg Phe Arg
                    930                     935                     940
Gln Gly Lys Asp Tyr Val Gly Glu Leu Ser Val Asp Leu Lys Arg Arg
945                     950                     955                     960
Leu Asp Ser Ile Thr Ser Ser Gln Ser Ser Ala Ser Ser Gly Phe Val
                    965                     970                     975
Glu Glu Lys Ser Leu Ser Asp Val Glu Glu Glu Glu Ala Ser Glu Glu
                    980                     985                     990
Leu Tyr Lys Asp Phe Leu Thr Leu Glu His Leu Ile Cys Tyr Ser Phe
                    995                     1000                    1005
Gln Val Ala Lys Gly Met Glu Phe Leu Ala Ser Arg Lys Cys Ile His
                    1010                    1015                    1020
Arg Asp Leu Ala Ala Arg Asn Ile Leu Leu Ser Glu Lys Asn Val Val
1025                    1030                    1035                    1040
Lys Ile Cys Asp Phe Gly Leu Ala Arg Asp Ile Tyr Lys Asp Pro Asp
```

```
                1045                    1050                    1055
Tyr Val Arg Lys Gly Asp Ala Arg Leu Pro Leu Lys Trp Met Ala Pro
            1060                    1065                    1070
Glu Thr Ile Phe Asp Arg Val Tyr Thr Ile Gln Ser Asp Val Trp Ser
        1075                    1080                    1085
Phe Gly Val Leu Leu Trp Glu Ile Phe Ser Leu Gly Ala Ser Pro Tyr
      1090                    1095                    1100
Pro Gly Val Lys Ile Asp Glu Glu Phe Cys Arg Arg Leu Lys Glu Gly
1105                    1110                    1115                    1120
Thr Arg Met Arg Ala Pro Asp Tyr Thr Thr Pro Glu Met Tyr Gln Thr
                1125                    1130                    1135
Met Leu Asp Cys Trp His Glu Asp Pro Asn Gln Arg Pro Ser Phe Ser
            1140                    1145                    1150
Glu Leu Val Glu His Leu Gly Asn Leu Leu Gln Ala Asn Ala Gln Gln
        1155                    1160                    1165
Asp Gly Lys Asp Tyr Ile Val Leu Pro Met Ser Glu Thr Leu Ser Met
    1170                    1175                    1180
Glu Glu Asp Ser Gly Leu Ser Leu Pro Thr Ser Pro Val Ser Cys Met
1185                    1190                    1195                    1200
Glu Glu Glu Glu Val Cys Asp Pro Lys Phe His Tyr Asp Asn Thr Ala
            1205                    1210                    1215
Gly Ile Ser His Tyr Leu Gln Asn Ser Lys Arg Lys Ser Arg Pro Val
            1220                    1225                    1230
Ser Val Lys Thr Phe Glu Asp Ile Pro Leu Glu Glu Pro Glu Val Lys
        1235                    1240                    1245
Val Ile Pro Asp Asp Ser Gln Thr Asp Ser Gly Met Val Leu Ala Ser
      1250                    1255                    1260
Glu Glu Leu Lys Thr Leu Glu Asp Arg Asn Lys Leu Ser Pro Ser Phe
1265                    1270                    1275                    1280
Gly Gly Met Met Pro Ser Lys Ser Arg Glu Ser Val Ala Ser Glu Gly
                1285                    1290                    1295
Ser Asn Gln Thr Ser Gly Tyr Gln Ser Gly Tyr His Ser Asp Asp Thr
            1300                    1305                    1310
Asp Thr Thr Val Tyr Ser Ser Asp Glu Ala Gly Leu Leu Lys Met Val
        1315                    1320                    1325
Asp Ala Ala Val His Ala Asp Ser Gly Thr Thr Leu Arg Ser Pro Pro
    1330                    1335                    1340
Val
1345
```